NATIONAL UNIVERSITY OF ENGINEERING

COLLEGE OF GEOLOGICAL, MINING AND METALLURGICAL ENGINEERING

MINING ENGINEERING PROGRAM

SM714 – MINING SUPPORT SERVICES

I. GENERAL INFORMATION

CODE	**:**	SM714 Mining Support Services
SEMESTER	**:**	7
CREDITS	**:**	3
HOURS PER WEEK	**:**	5 (Theory–Practice)
PREREQUISITES	**:**	MI622 Non-Metallics and Their Marketing FI675 Thermodynamics
CONDITION	**:**	Compulsory
DEPARTMENT	**:**	Mining Engineering

II. COURSE DESCRIPTION

The course prepares students for identifying and understanding the characteristics and applications of the most relevant equipment used in mining operations. Students analyze the operation principles, technical specifications, nomenclature and functioning of equipment for underground and surface mining. Student also analyze the technological trends and equipment maintenance for assuring their proper and efficient operability along the life cycle.

III. COURSE OUTCOMES

At the end of the course, students:

1. Identify required equipment for underground and surface mining, as well as auxiliary equipment, selection criteria and costs.
2. Understand the function, specifications, and nomenclature of equipment for underground and surface mining.
3. Interpret and apply the norms of the Occupational Health and Safety Regulations.
4. Understand the process of equipment maintenance management for assuring their operability and efficiency.
5. Know the technological trends in mining equipment.

IV. LEARNING UNITS

1. INTRODUCTION

Role of equipment in production process / Equipment trends and evolution / Equipment classification according to application scope / Classification of drilling equipment / Power driving and transmission equipment.

2. SURFACE MINING EQUIPMENT

Mine drilling, load and transport equipment / Shovel / Cables / Frontal hydraulic shovel / Wheel frontal loader / Mining truck / Rotating driller / DTH driller / Track driller / Earth moving equipment / Crawler tractor / Crawler excavator / Moto-leveler / Diverse auxiliary equipment.

3. UNDERGROUND MINING EQUIPMENT

Mine drilling, load and transport equipment / Load profile loaders / Dumper articulated truck / Driller jumbo / Long drillers / Roof bolter equipment / Support equipment / Scaler / Shortcrete equipment / Explosive loaders / Equipment for fast excavation in underground mining /

Chimney excavation / Raise boring / Slot boring / Box hole / TBM Tunnel excavation / Mining conventional equipment / Winches / Locomotives / Shovels / Manual drillers / Pumps / Air compressors.

4. **EQUIPMENT MAINTENANCE MANAGEMENT**
   Evolution of maintenance management / Maintenance indicators / KPI / Benchmarking / Economic life / Useful life / Physical life / Equipment replacement / Equipment reliability.

5. **SAFETY OF MINING EQUIPMENT AND MACHINERY**
   Introduction / Mining accident statistics / Accident causes / Safety systems / Operator training / Occupational health / Accident prevention / Safety recommendations.

6. **TECHNOLOGICAL INNOVATION OF MINING EQUIPMENT**
   Digital communication / Control integrated systems / Continuous extraction mining / Mining automation and remote control / Remote mining / Robotics in miming.

V. PRACTICE EXPERIENCE

1. Visit to a mining plant to review equipment and machinery.
2. Visit to a mining equipment providing company

VI. METHODOLOGY

This course is organized in sessions of theory and practice. In theory sessions the concepts and applications are explained. In practice sessions, real cases related to mining equipment selection, operation and maintenance. At the end of the course students present a final report containing the solution to a given problem on equipment selection, operation and safety.

VII. GRADING FORMULA

The Final Grade PF is calculated as follow:

PF = (EP + EF + PP) / 3

EP: Mid-term Exam EF: Final Exam
PP: Average grade of practice work

VIII. BIBLIOGRAPHY

1. **SINGHAL, Raj**
   Mine Panning and Equipment Selection, 2010
2. **CARERPILAR**
   Equipment and Machinery Performance Handbook, 2015.
3. **KOMATSU**
   Equipment Efficiency Handbook, 2015.